

Application of Method 1668A in the Development of a TMDL for PCBs for the Delaware Estuary

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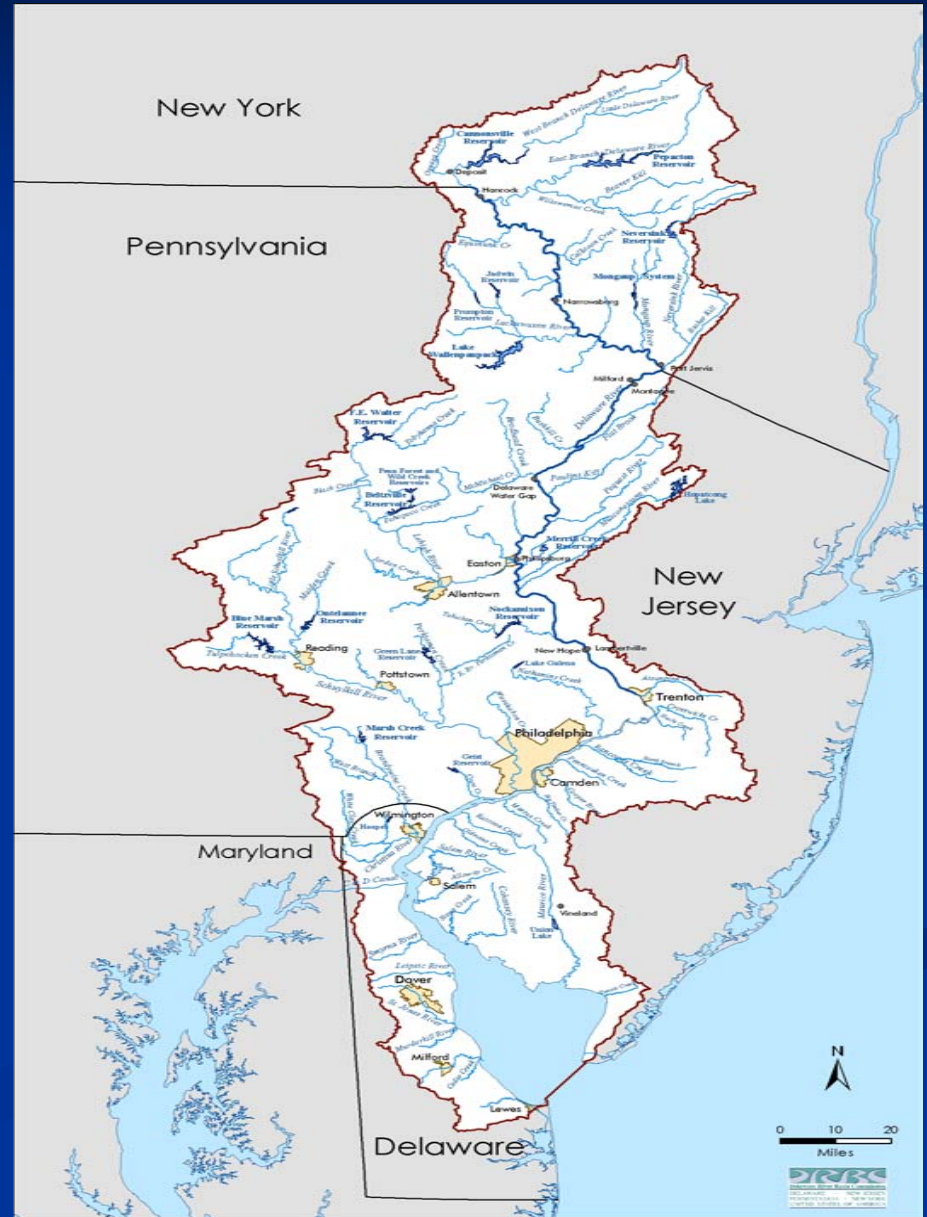
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The Delaware River Basin

- 2 EPA Regions
- 4 States
- 13,539 square miles
- 216 tributary streams
- Flow
 - Aver. 11,750 cfs
 - Max. 329,000 cfs
- Pop. 8 million



Issues

- ✓ The tidal Delaware River has been included on the Section 303(d) lists of impaired waters by the three bordering states (New York, New Jersey and Delaware) for PCB contamination; therefore requiring the development of TMDLs.
- ✓ The controlling date for the development of these TMDLs is December 2003. This date is specified in court or administrative agreements between the three states and U.S. EPA.

Water Quality Criteria

Zone	River Mile	Designated Use	Applicability of Objectives	Stream Quality Objectives for PCBs
2 & 3	133.4 ~ 95.0	Water and Fish Ingestion	Freshwater	44.4 pg/L
4	95.0 ~ 78.8	Fish Ingestion Only	Freshwater	44.8 pg/L
5	78.8 ~ 68.75	Fish Ingestion Only	Freshwater	44.8 pg/L
	68.75 ~ 48.2	Fish Ingestion Only	Marine	7.9 pg/L

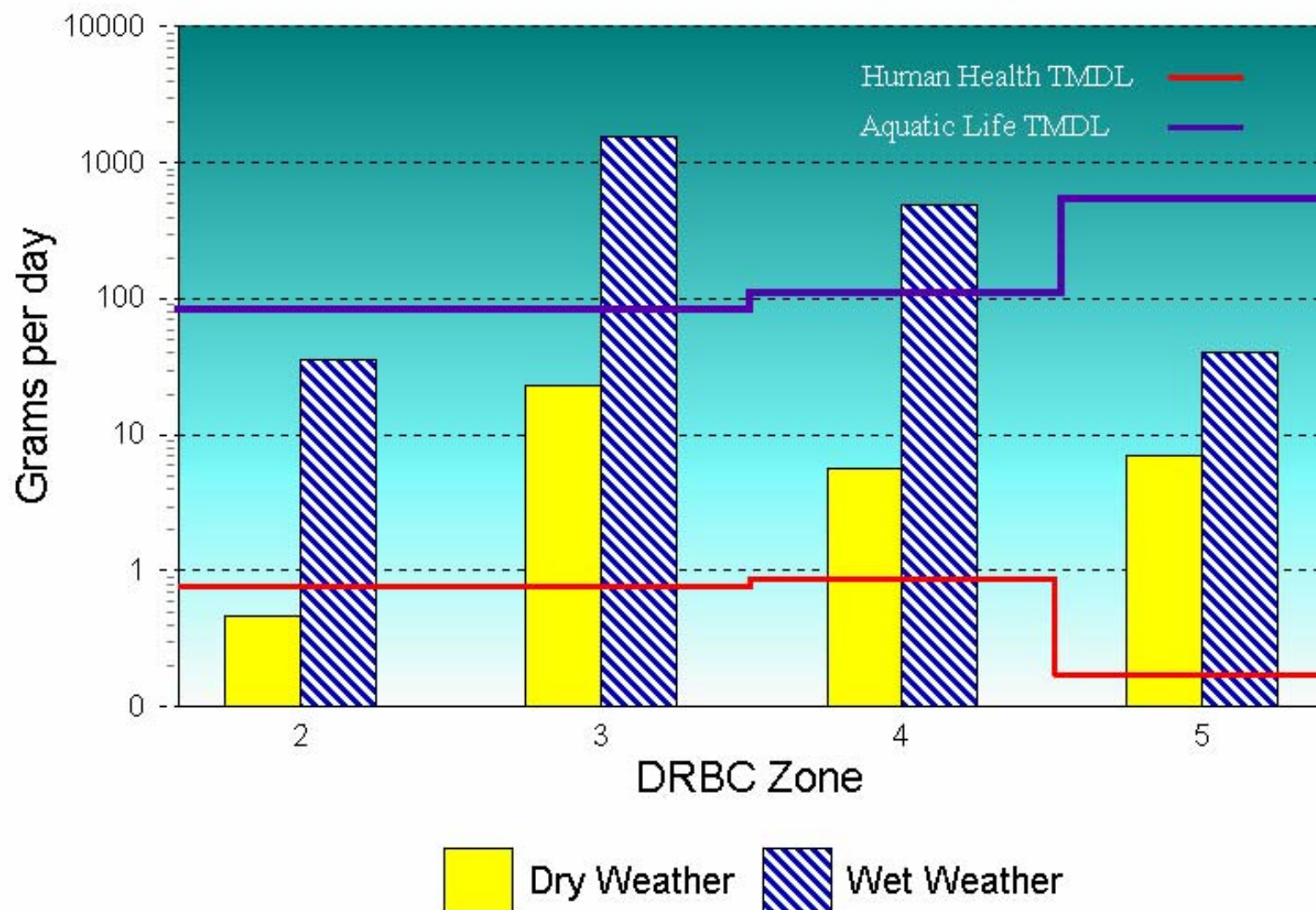
DRBC Water Quality Zones



Previous Investigations

- ❑ Previous monitoring of wastewater effluents using conventional Aroclor methods i.e. EPA method 608, have not detected PCBs.
- ❑ In 1996, DRBC in cooperation with DNREC and EPA Region III initiated the PCB Loading Study utilizing method 1668.
- ❑ The 1996 study focused on 10 tributaries to the tidal Delaware River and 6 municipal wastewater treatment plants, and monitored for 82 congeners.

PCB Mass Loading by Zone



Implications on Loadings Estimates

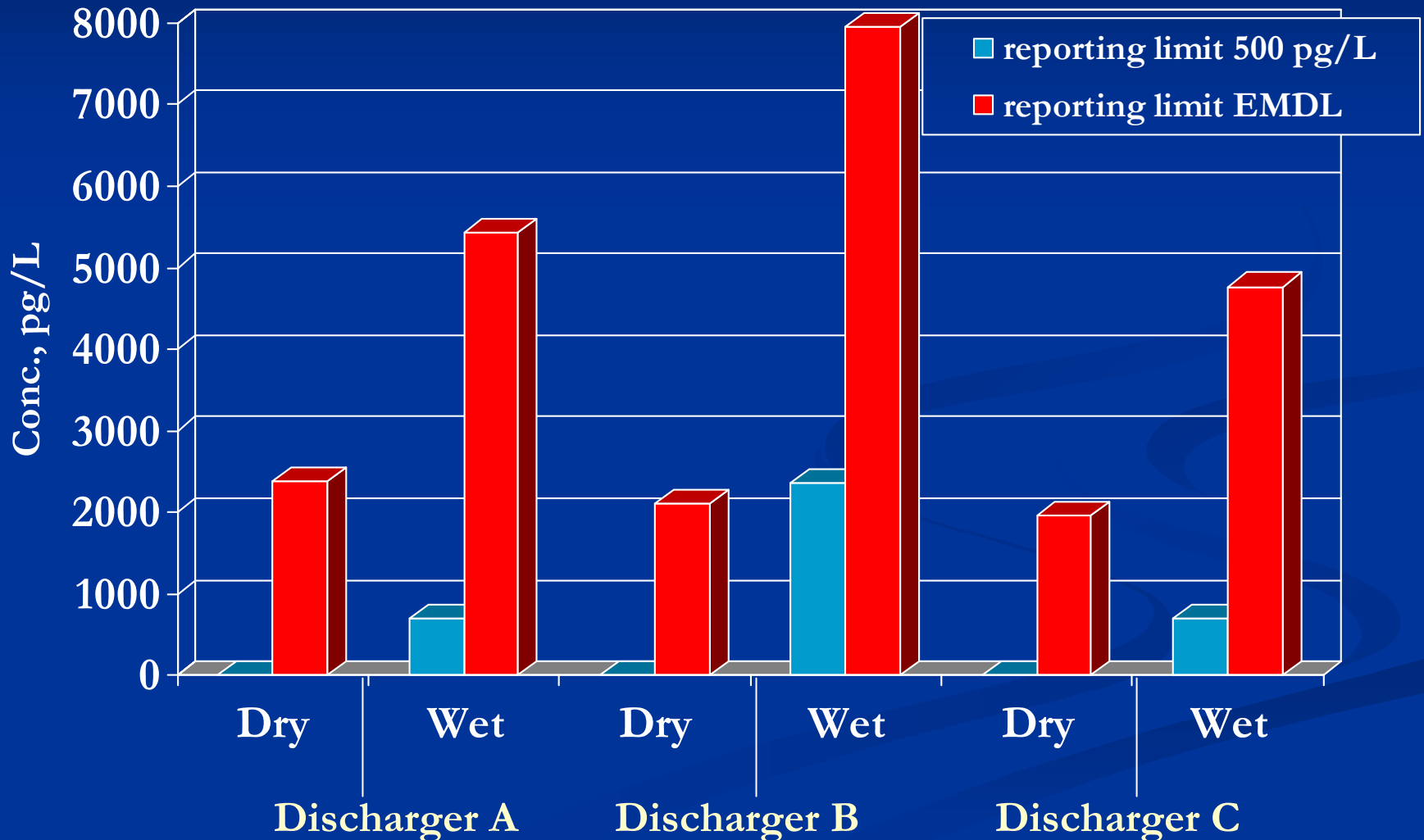
- Detection limits greatly impact loadings calculations.
- PCB Methods (608, 8082a, 1668a) have wide variability in detection limits.
- Therefore; low detection limits are required when trying to:
 - ✓ achieve water quality standards on the order of pg/L.
 - ✓ produce an accurate TMDL.
 - ✓ Accurately characterize sources.

Discharger Data

- A performance based analytical approach was recommended by the TAC, therefore, analysis was conducted utilizing two analytical methods.
 - 8082a (GC/ECD)
 - 1668a (HR GC/MS)
- Reporting limits were specified ~ 500 pg/L

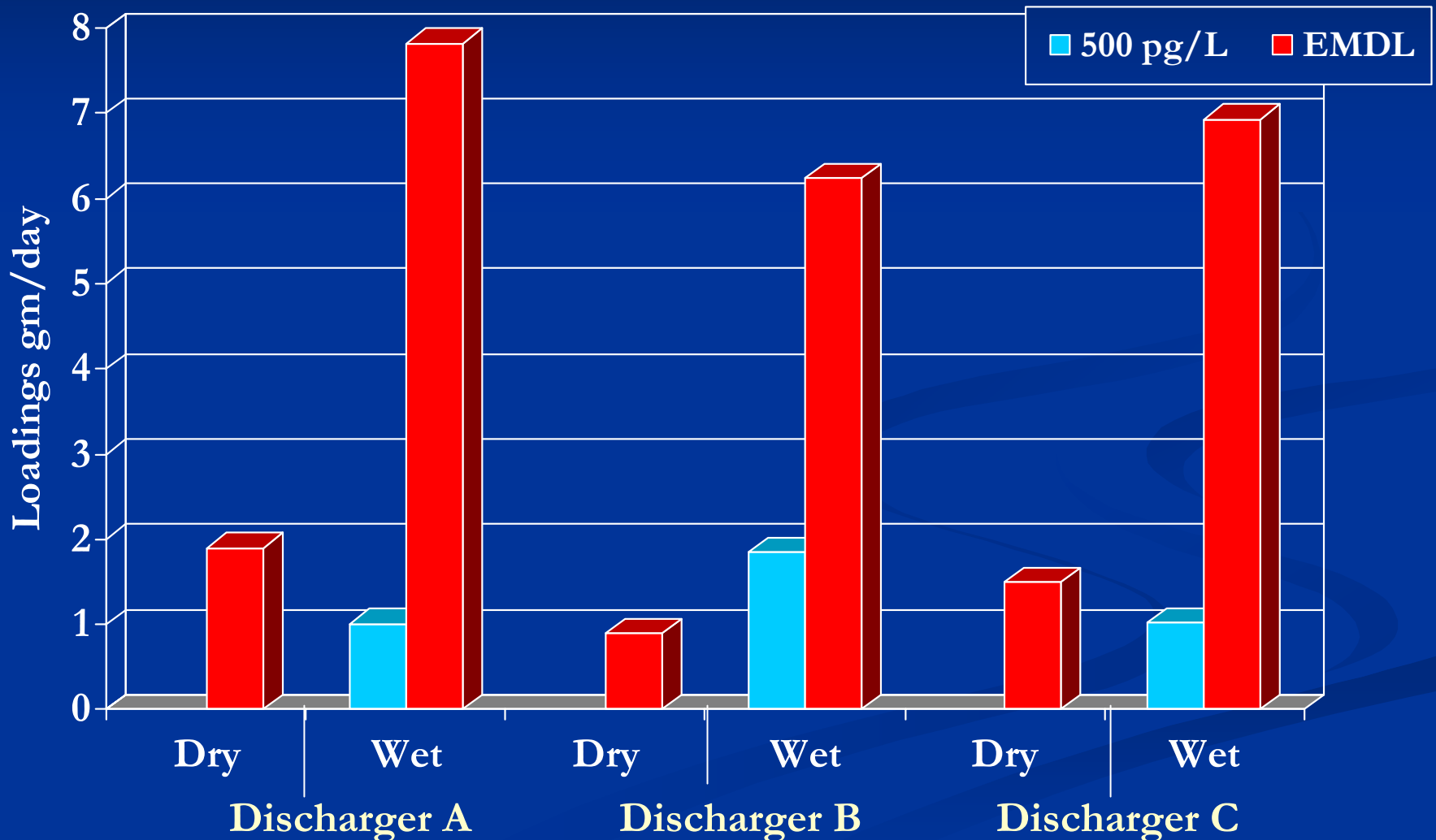
Example: Analytical Results for Three Facilities

For Sum of Selected Congeners utilizing Method 1668A



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Current Study

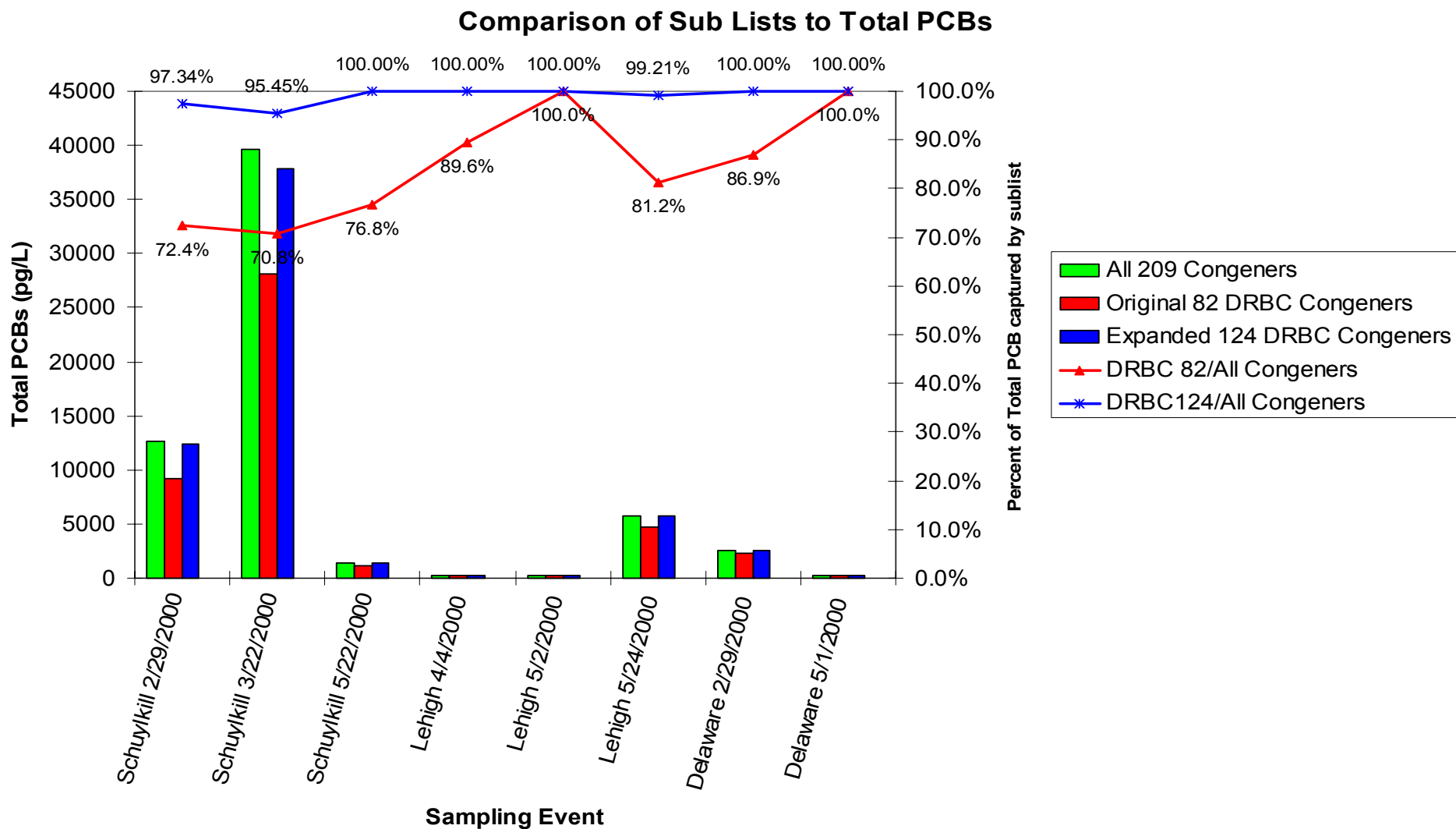
■ Utilizes:

- Method 1668A a HRGC/HRMS methodology
- Particulate & Dissolved phases are analyzed

■ Merits:

- Lower detection limits
- Capability to analyze for all 209 congeners
- Allow us to select congeners that are in all matrices, or are toxicologically important
- Congener-specific analysis allows source trackdown and TEQ calculations

DRBC currently monitors for 124 congeners



To achieve lower detection limits and to ensure enough sample for particulate PCB analysis.

- 20-liter Stainless Steel Canisters were used for sample collection.
- Samples were filtered through a 0.7 micron wound glass filtered. Filtrate extracted by elution through an XAD column.
- SDL typically were $< .5 \text{ pg/L}$



Conclusions

- Method 1668A uniquely suited to evaluate PCB concentrations in the Delaware Estuary.
- Selected NPDES permits currently incorporate the use of Method 1668A for effluent characterization.
- All current and future investigations of ambient water, sediments, tributaries and point sources will utilize method 1668a
- Upon implementation of a PCB TMDL, EPA method 1668a can be used to evaluate long-term trends in PCB concentrations with less uncertainty than any other analytical method.